Leica iCON excavate iCP31

User Manual

Version 1.1
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on your purchase of iCON excavate iCP31 machine control system. iCON excavate iCP31 System is an ideal tool for increasing productivity in all aspects of the construction earthmoving industry.

This manual contains important safety directions as well as instructions for setting up the system and operating it. Refer to chapter "13 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.

To ensure safety when using the system, please also observe the directions and instructions contained in the User Manual and Safety Handbook issued by the:

- Machine manufacturer,
- Controller manufacturer and
- Sensor manufacturer.

Product identification

The type and serial number of your products are indicated on the label on the base of the unit.
Enter the model and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type:	Control Box	Serial No.:	_____
Type:	Cradle	Serial No.:	_____
Type:	Junction Box	Serial No.:	_____
Type:	Boom 1 Sensor	Serial No.:	_____
Type:	Stick/Laser Sensor	Serial No.:	_____
Type:	Bucket Sensor	Serial No.:	_____
Type:	Rotation Sensor	Serial No.:	_____
Type:	Can Junction Box	Serial No.:	_____
Type:	Boom 2 Sensor	Serial No.:	_____
Type:	Tilt Bucket Sensor	Serial No.:	_____
Type:	Remote Display	Serial No.:	_____

Symbols

The symbols used in this manual have the following meanings:

Type	Description
Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
Warning	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
Caution	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

About This Manual

iCON excavate iCP31

The iCON excavate iCP31 System is a basic machine control system that provides the operators with a visual reference of the bucket position. The iCON excavate iCP31 Control Box is designed to be easy to use and provides the operator with a range of information and setups to assist in all aspects of machine control.

Major components

The iCON excavate iCP31 System consists of several components depending on the type of machine and the customers needs to perform their earthmoving tasks.

The basic components of the systems are the iCON excavate iCP31 Control Box, angle sensors, and cabeling.

Purpose of this manual

The purpose of this manual is to explain the features and operation of the iCON excavate iCP31 System. The specific uses of the systems are varied.
This manual is not intended to teach each specific use.

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1 System Overview

1.1 Product Description and Features

General

The iCON excavate iCP31 System from Leica Geosystems consists of a iCON excavate iCP31 Control Box with a varying number of sensors depending on which system is installed on the excavator.
The control box has buttons surrounding the screen for user input. The 3.5" colour display, incorporates a state of the art LCD colour screen, making it easy to use, even in bright, sunny conditions.

The iCON excavate iCP31 System is very easy to upgrade from e.g. Single Grade to Dual Grade. You just need to add the requisite sensors to your excavator. Please contact your local dealer for details.

The rugged IP67 enclosure is designed for harsh environments.

Warning

This product may be installed on building machinery only by an appropriately trained and qualified specialist.

Warning

Unauthorised modification of machines by mounting the product may alter the function and safety of the machine.
Precautions:
Follow the instructions of the machine manufacturer. If no appropriate instruction is available, ask machine manufacturer for instructions before mounting the product.

The general principle of the iCON excavate iCP31 System

The sensors feed information to the iCON excavate iCP31 Control Box which makes the calculations.
You just establish a known reference point, for example Laser beam or stake, and then enter the required offset and grade after which you are ready to start digging.

On the iCON excavate iCP31 Control Box you can overlook all guidance and status information on the LCD display. Bright numbers and possibility for guidance by audio signals also make you able to determine if you are **HIGH**, **ON GRADE** or **LOW**.

Power supply, communication

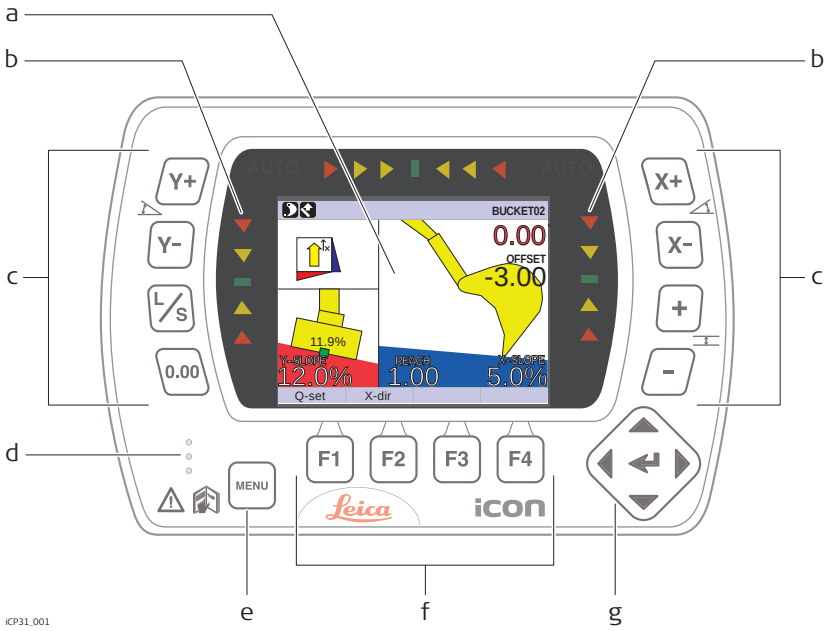
The control box is powered from a cradle based on a sophisticated induction solution, while data is transferred wirelessly via infrared between the cradle and the control box. Leica Geosystems recommends to use the "MMB1300 Cradle for control box". "Cradle" will be used throughout this manual.

Handling precautions

The iCON excavate iCP31 System is a precision system and should be treated with care. When using the system with a rotating laser, please make sure that the laser is calibrated and set up correctly.

Safety information

If using a rotating laser as reference, do not stare into the laser beam when the laser is working.
For more information, please see the documentation of your laser.

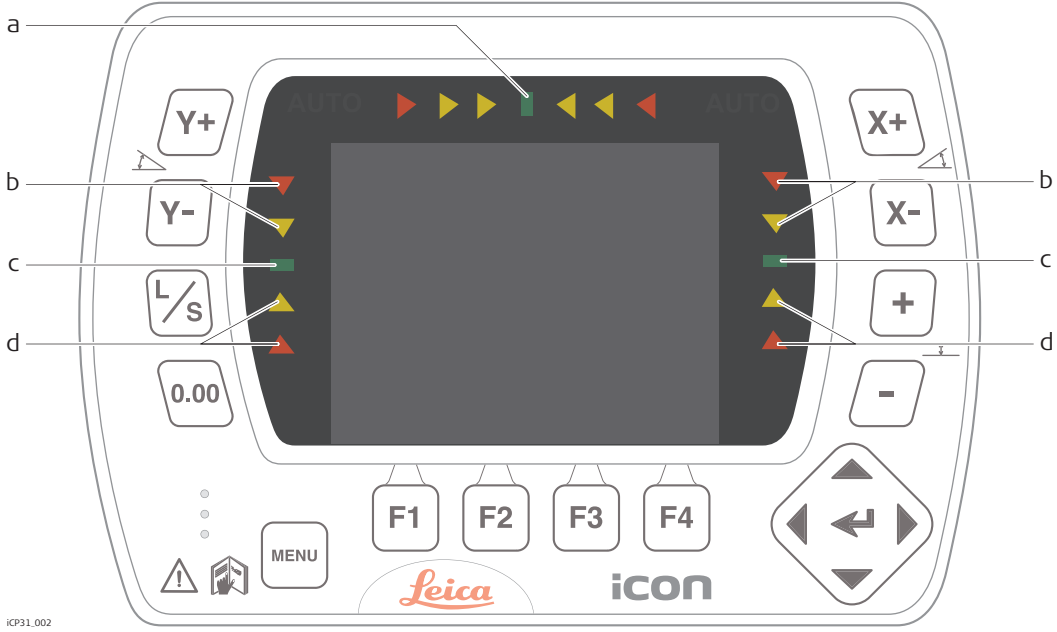


a) Graphical display
b) Offset indication LED's
c) Setup buttons
d) Speaker
e) Selection of bucket
f) Function buttons
g) Navigation button

Description of buttons

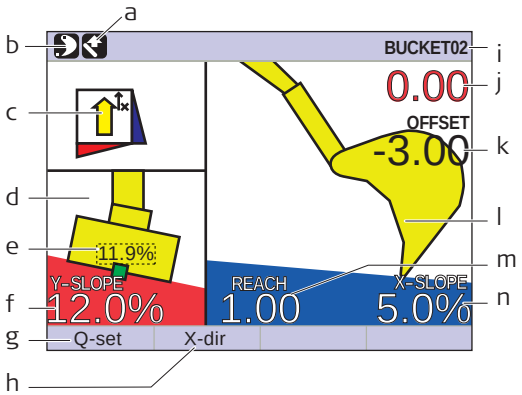
Button	Description
Y+ Y-	Increases/decreases slope in Y-direction.
X+ X-	Increases/decreases slope in X-direction.
+ -	Increases/decreases offset.
L/S	Load and Store height.
0.00	Reset button. Used for setting the reference level and resetting earlier values in the menu.
MENU	Selecting a bucket.
	Navigation button. Allows you to navigate through the menus. Press left/right arrows to move between bucket items. **Naming convention within this manual:** • ↵: Enter button • ◆: Left / Right arrow buttons • ◆ : Up / Down arrow buttons
F1	Quick settings. Up to 10 user settings can be stored.
F2	X-direction. Used for setting the X-direction.

LED Display



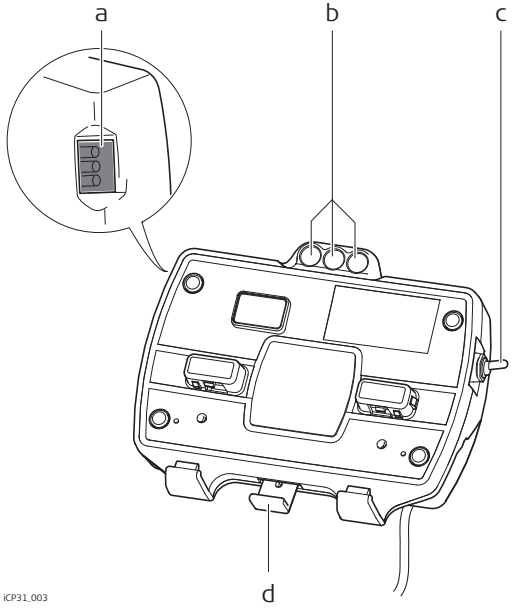
a) Tilt / Bucket indication
b) Position of the bucket is HIGH
c) Position of the bucket is ON-GRADE
d) Position of the bucket is LOW

LCD Display



a) Height measurement direction:
   NORMAL / VERTICAL
b) Reference Method:
   LASER / BUCKET
c) Direction of X
d) Tilt Slope display:
   Active when Tilt Sensor is connected
e) Actual Bucket Slope
f) Y Slope
g) Quick Settings
h) Setting Direction of X
i) Selected bucket
j) Distance to ONGRADE
k) Desired OFFSET
l) Bucket position display
m) Reach measurement
n) X Slope

Cradle



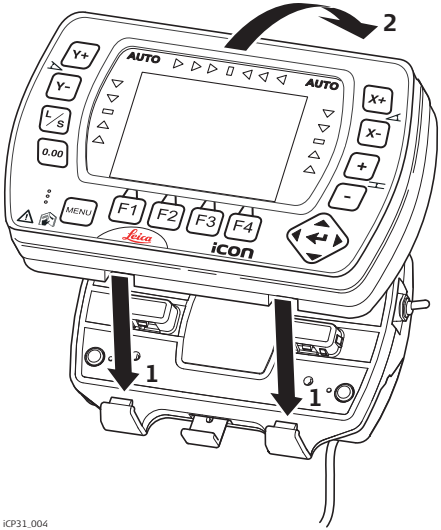
a) Power and data transfer LED indicators
b) Holding magnets
c) On/off switch
d) Release button for control box

1.2 Getting Started

System start

To get the system started complete the following steps:

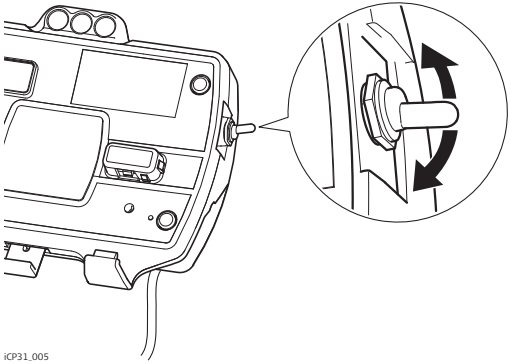
1. Snap control box onto cradle.



To connect the control box to the cradle:

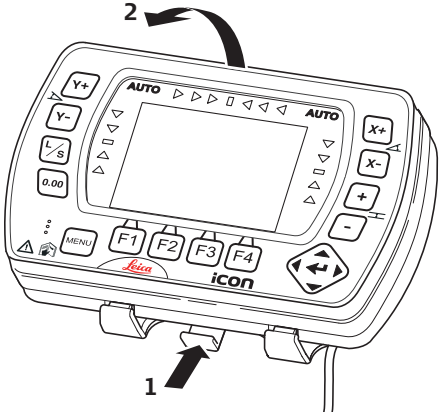
1. Put the control box on the holding hooks in the bottom of the cradle.
2. Then snap the control box onto the cradle by pressing it towards the cradle.

2. Turn on the control box.



To turn the system on and off, use the power switch on the right side of the cradle. This is the master switch for the entire system.

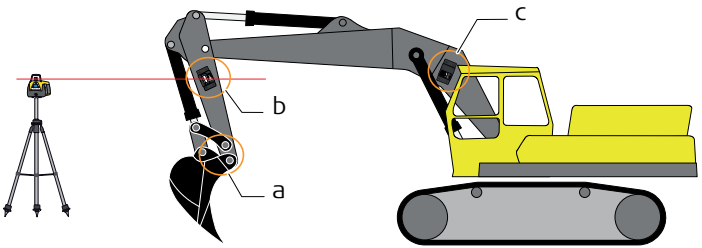
Removing the box will also turn off the power.

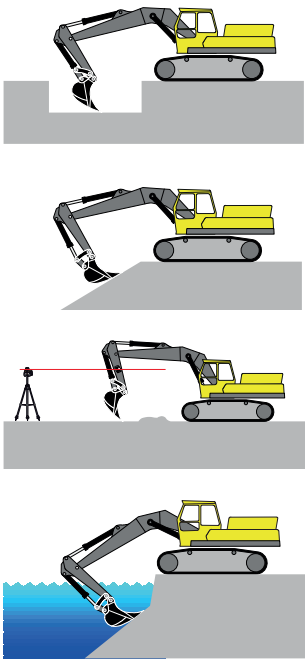


To release the control box simply press the release button at the bottom of the cradle, pull the control box towards you and then lift it away from the cradle.

1.3 Single Slope System

Basic system

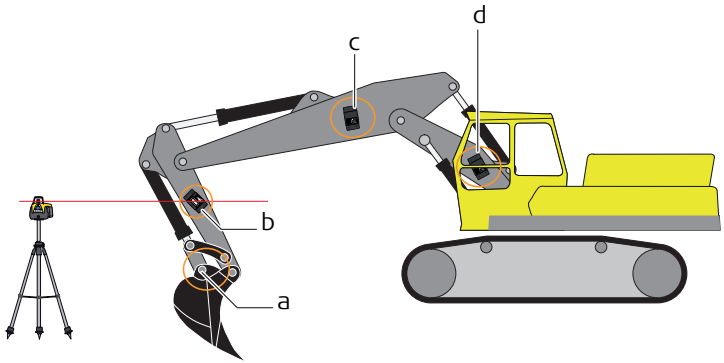


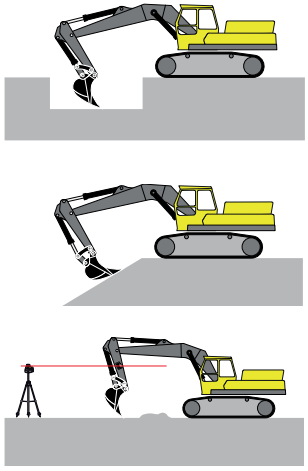


a) Bucket Sensor
b) Stick/Laser Sensor
c) Boom 1 Sensor

☞ On excavators with two booms, a sensor is mounted on each boom.

Basic system with Articulated Boom



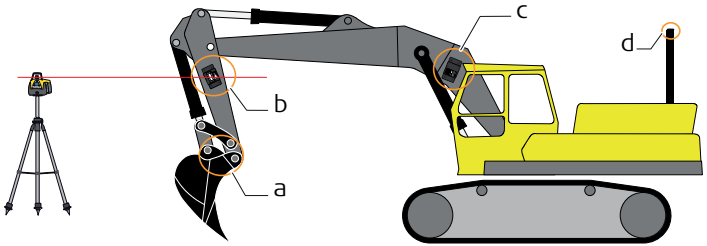


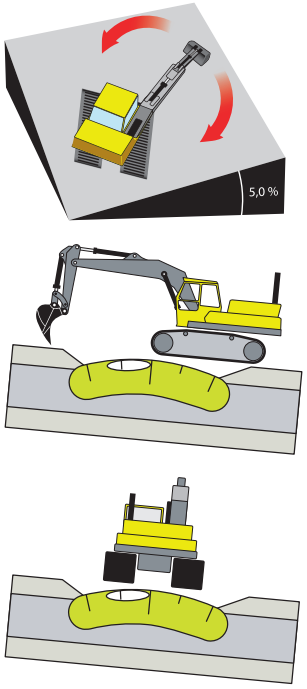
a) Bucket Sensor
b) Stick/Laser Sensor
c) Boom 2 sensor
d) Boom 1 sensor

☞ On excavators with 2 booms, a sensor is mounted on each boom.

1.4 Dual Slope System

Pro system

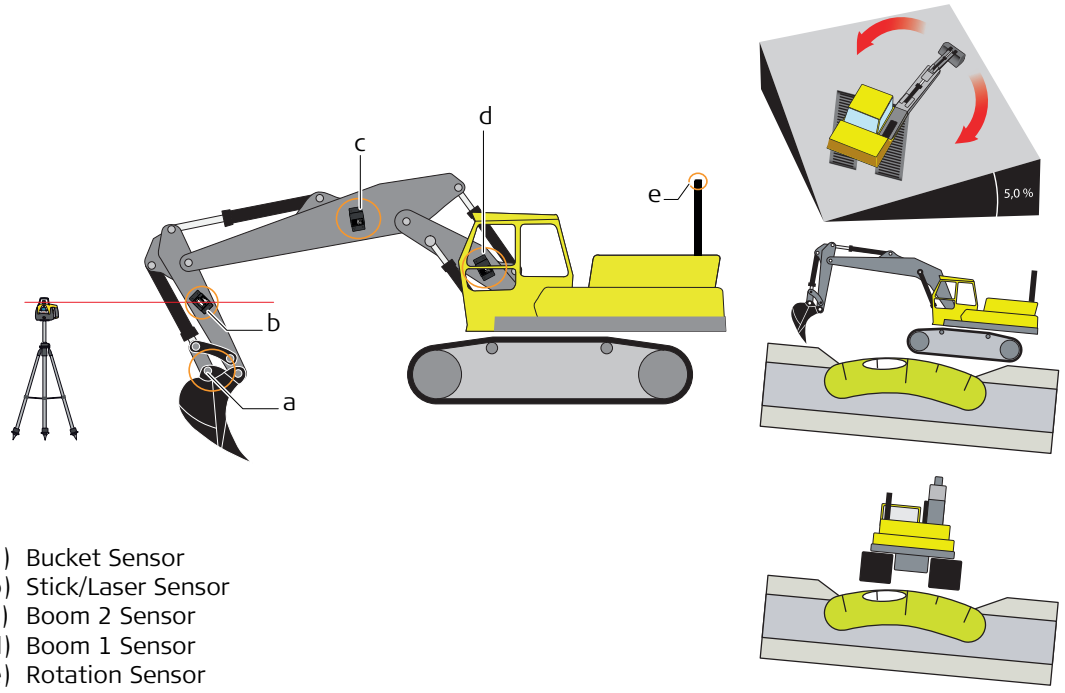




a) Bucket Sensor
b) Stick/Laser Sensor
c) Boom 1 Sensor
d) Rotation Sensor

Besides being a rotation sensor, the Rotation Sensor also functions as a Pitch and Roll sensor.

Pro system with Articulated boom

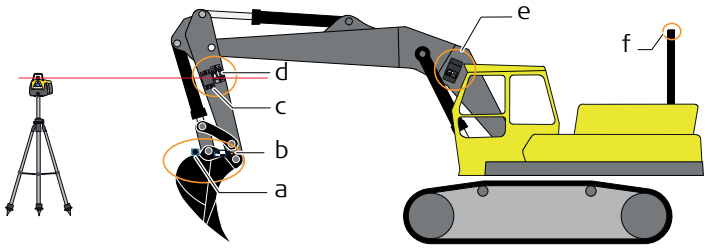


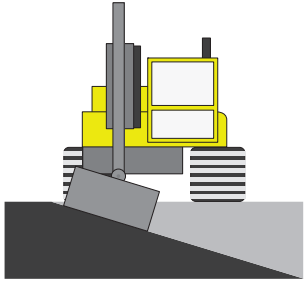
a) Bucket Sensor
b) Stick/Laser Sensor
c) Boom 2 Sensor
d) Boom 1 Sensor
e) Rotation Sensor

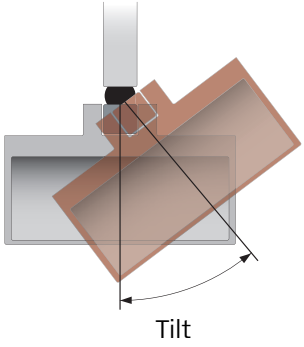
Besides being a rotation sensor, the Rotation Sensor also functions as a Pitch and Roll sensor.

1.5 Tilt Slope System

Pro system with Tilt slope



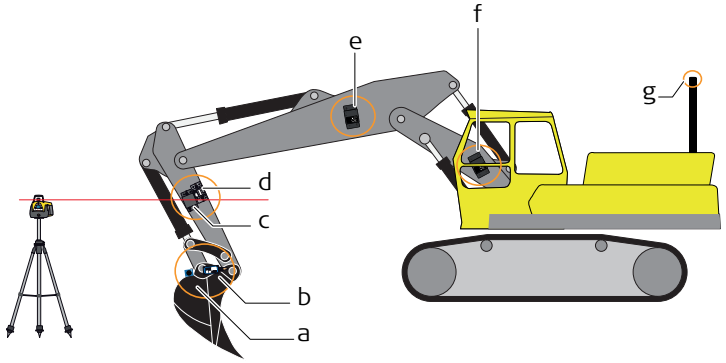


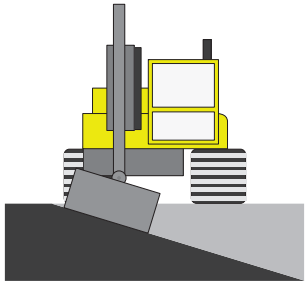


a) Tilt Bucket Sensor
b) Bucket Sensor
c) CAN Junction box
d) Stick/Laser Sensor
e) Boom 1 Sensor
f) Rotation Sensor

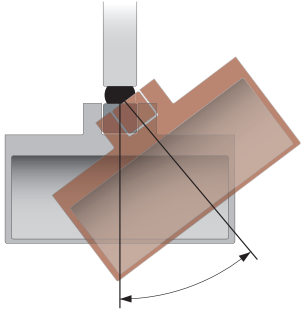
The Tilt Bucket Sensor is connected via the CAN Junction Box.

Pro system with Tilt slope and Articulated boom





a) Tilt Bucket Sensor
b) Bucket Sensor
c) CAN Junction box
d) Stick/Laser Sensor
e) Boom 2 Sensor
f) Boom 1 Sensor
g) Rotation Sensor



Tilt

The Tilt Bucket Sensor is connected via the CAN Junction Box.

2 Setting the Direction of X

Description

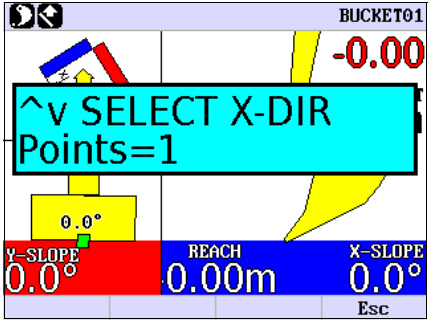
The Direction of X is the main direction of the excavator boom.
It is very important to set the Direction of X when working in Dual Slope Mode.

There are two ways to set the Direction of X.
The traditional way is to use one-point where the correct Direction of X is already known.
The more advanced way is to use the two-point method. You can use this method when working with a string line for example.

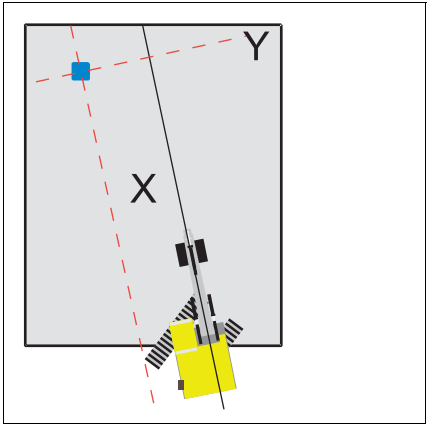
One-point method

This is how you set the Direction of X using the one point method:

1. Press the F2 button, which will open the Direction of X menu.
2. Select **One-point method** by pressing the up/down arrows ⬍.



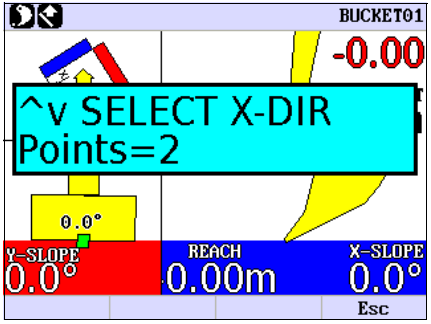
3. Turn the machine so that the boom points towards the Direction of X.
4. Press the Enter button ↵ to save the Direction of X.

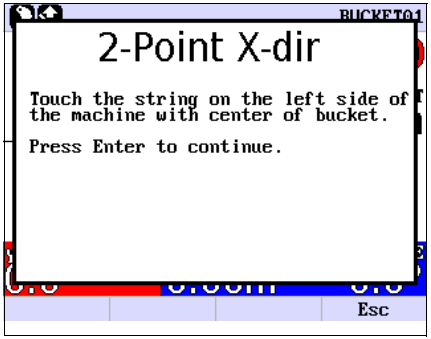


Two-point method

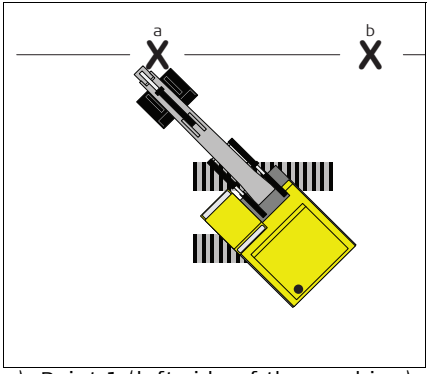
This is how you set the X direction using the two point method:

1. Press the F2 button, which will open the Direction of X menu.
2. Select **Two-point method** by pressing the up arrow ▲.
3. Press the Enter button ↵ to enter the two point method.



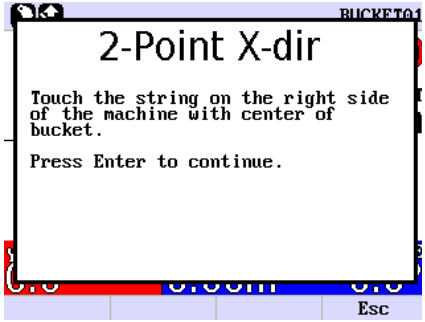


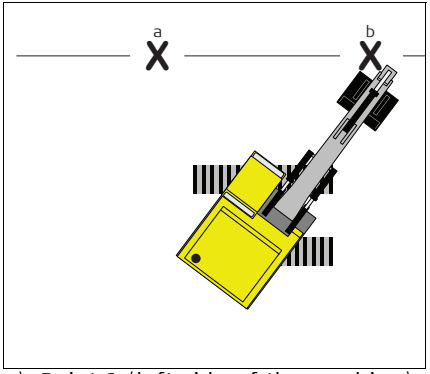
4. Place the center of the bucket on point 1 (left side of the machine).
5. Press the Enter button ↵ to save point 1.



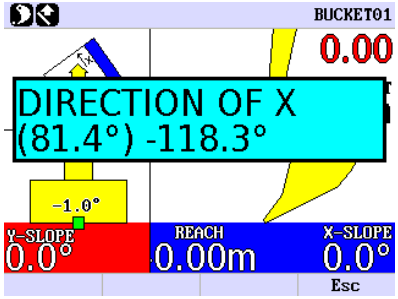
a) Point 1 (left side of the machine)
b) Point 2 (right side of the machine)

6. Place the center of the bucket on point 2 (right side of the machine).
7. Press the Enter button ↵ to save point 2.
   The Direction of X has now been set to be exactly between the two points that were touched.





a) Point 1 (left side of the machine)
b) Point 2 (right side of the machine)


BUCKET01
0.00
DIRECTION OF X
(81.4°) -118.3°
-1.0°
Y-SLOPE
0.0°
REACH
0.00m
X-SLOPE
0.0°
Esc

Setting the desired offset

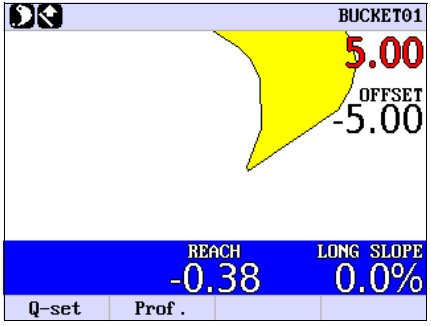
1. Make sure that **LASER MODE** is set to **OFF** (Bucket is selected as reference) in the menu option **SETUP HEIGHT -> LASER MODE**.
2. Press the + or - button until the display shows the desired offset value.

Example

If you want to enter a offset of 5.0 m, press the - button until the display shows the value -5.00.

The display to the right indicates:

1. The bucket selected is No. 1.
2. The value in red 5.00 indicates the distance to ONGRADE.
3. The desired offset is set to -5.00.
4. The X-slope is 0.0% (no slope).
5. The bucket tip is used as reference.
6. The distance is measured vertically .
7. REACH=-0.38 means that the bucket has been moved 38 cm closer to the machine since the 0.00 button was pressed.

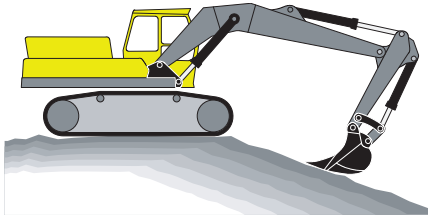


Digging with slope in X-direction

Press the X+ or X- button until the display shows the slope desired.

Example:

If you want a slope where the excavation is getting shallower as the bucket comes nearer the excavator, press the right X+ button until the display shows the desired slope.

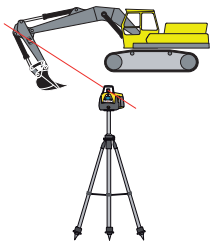


Positive slope

Moving the excavator

1. Make sure that OFF is selected in the menu option **SETUP HEIGHT -> LASER MODE**.
2. Put the bucket at a place that can be reached again after moving the excavator.
3. Press the L/S button to store the position.
   The red display will flash to indicate that the position is stored.
4. Move the excavator and put the bucket at **exactly** the same place where the position above was stored.
5. Press the L/S button again to load the position.

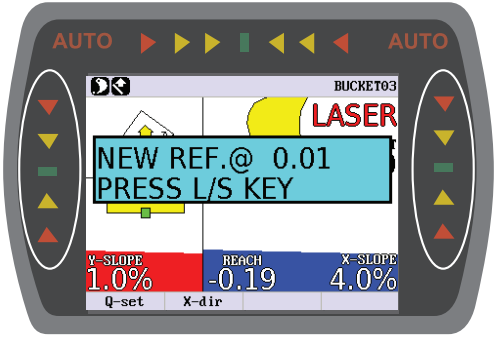
Basic operation instructions



1. Make sure that INTEGRATED is selected in the menu option **SETUP HEIGHT -> LASER MODE** .
2. Make sure that the rotation laser is activated.
3. Move the Laser Sensor, so that it can detect the laser beam. When the sensor detects the beam, the message

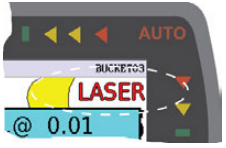
   NEW REF. @ 0.00
   PRESS L/S KEY

   is shown in the display.



When the sensor approaches the beam, the LED-diodes on the left and right side of the control box will flash **slowly** in the direction in which the sensor is to be moved in order to detect the laser beam. When the green diodes flash **quickly**, the sensor is able to detect the beam.

4. Press the L/S button to set the reference point.
   When the display flashes the message **LASER**, the reference point has been accepted. The values of actual Offset and desired Offset depend on the actual position of stick and bucket.



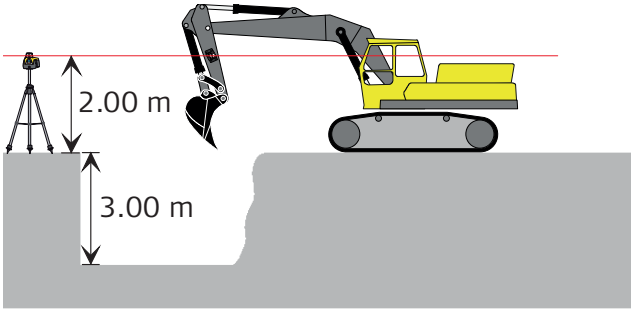
Setting the desired offset

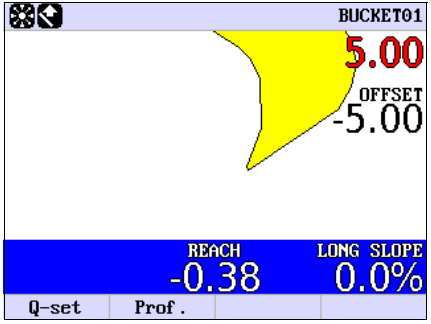
Press the [+] or [-] button until the display shows the desired value.

☞ The reference point is the laser beam.

Example:

If you want to enter a offset of 5.0 m below the laser beam, press the [-] button until the display shows the value -5.00.

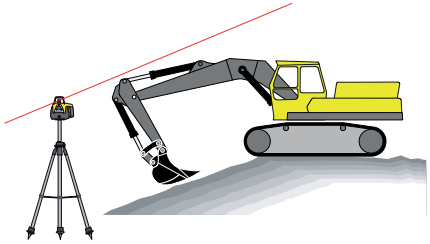




Digging with slope in X-direction

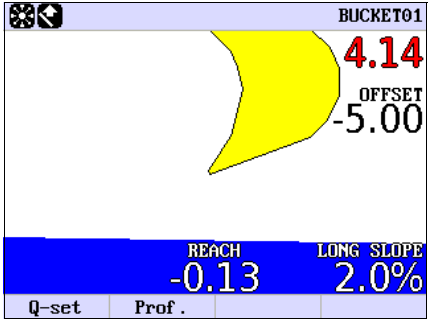
Press the [X+] or [X-] button until the display shows the slope desired.

The slope you enter on the display must always be the same as the slope of the rotation laser.



Example:

If you want a slope of 2%, where the excavation is getting shallower as the bucket comes nearer the excavator, press the [X+] button until the display shows the value 2.0%.

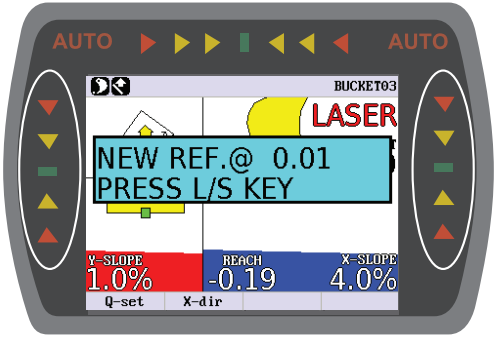


Moving the excavator

1. Make sure that INTEGRATED is selected in the menu option **SETUP HEIGHT -> LASER MODE** .
2. Move the excavator to the desired location.
3. Move the Laser Sensor, so that it can detect the laser beam.
   When the sensor detects the beam, the message

   NEW REF. @. 0.00
   PRESS L/S KEY

   is shown in the display.



When the sensor approaches the beam, the LED-diodes on the left and right side of the control box will flash **slowly** in the direction in which the sensor is to be moved in order to detect the laser beam. When the green diodes flash **quickly**, the sensor is able to detect the beam.

4. Press the L/S button to set the reference point.
   When the display flashes the message **LASER**, the reference point has been accepted. The values of actual Offset and desired Offset depend on the actual position of stick and bucket.

5 Dual Slope Mode

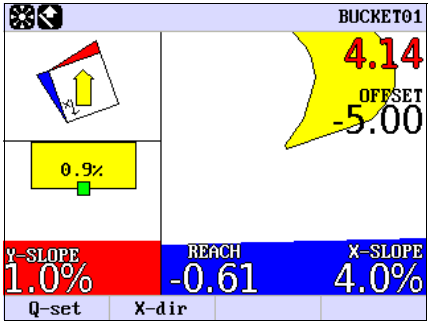
Description

1. Turn on the display.
2. Press the Enter button ↵. You will now enter the User Menu.
3. Press the right arrow ▶ to select the option **DUAL SLOPE**.
4. Press the up arrow ▲ to turn **DUAL SLOPE ON** or **OFF**.
5. Leave the User Menu by pressing the [F4] button.
6. **Adjustment of Y slope**.
   Press the [Y+] or [Y-] button until the display shows the desired value.
7. **Setting the Direction of X.**
   Turn the machine so that the bucket points towards the Direction of X.
   Press the [F2] button, which sets the Direction of X .

☞ It is very important to set the Direction of X in Dual Slope Mode.

8. **Adjustment of X slope**.
   Press the [X+] or [X-] button until the display shows the desired value.
9. Adjust the offset underneath the laser beam by pressing the [+] or [-] button until the display shows the desired value.

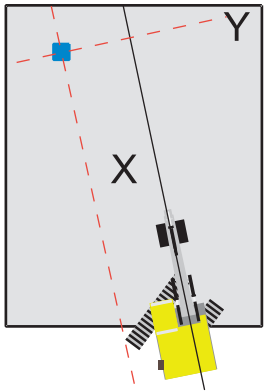
The display to the right indicates:



1. The bucket selected is No. 1.
2. The value in red 4.14 indicates the distance to ONGRADE.
3. The desired offset is set to -5.00.
4. The X-slope is 4.0 %.
5. REACH=-0.61 means that the bucket has been moved 61 cm closer to the machine since the 0.00 button was pressed.
6. The Y-slope is 1.0 %.
7. A laser beam is used as reference .
8. The distance is measured vertically .

Example

The laser (blue) is adjusted to the following slopes 4.0 % in the X direction and 1.0 % in the Y direction.



1. Turn on the display.
2. Press the Enter button ↵. You will now enter the User Menu.
3. Select **DUAL SLOPE** by pressing the right arrow ▶.
4. Select **ON** by pressing the up arrow ▲.

5. Leave the Menu by pressing the F4 button.
6. Set the desired **Y Slope** by pressing the Y+ or Y- button. (1.0%)

☞ Positive slope if the excavation gets deeper from the machine and to the right.

7. Turn the machine so that the bucket points to the direction of X.

   Press the F2 button.
8. Press the X+ or X- button until the display shows the desired value for X Slope. (4.0%)

☞ Positive slope if the excavation gets deeper from the machine and towards the bucket.

9. Adjust the offset underneath the laser beam by pressing the + or - button until the display shows the desired value.

10. Move the Laser Sensor so that it can detect the laser beam.
    When the display reads

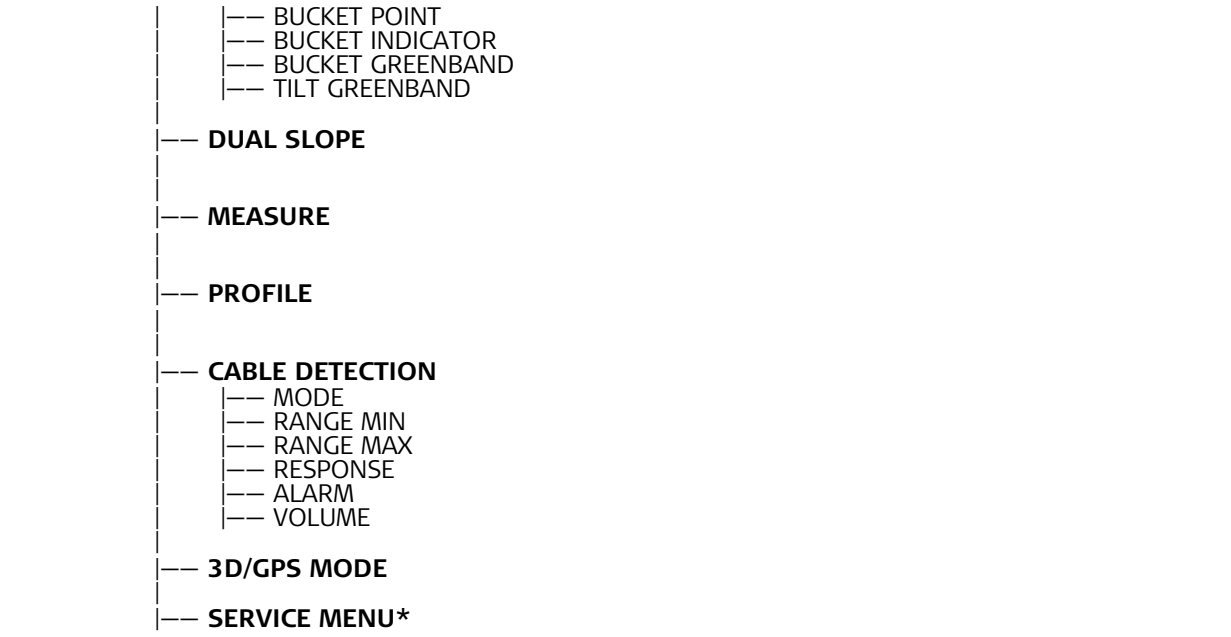
    NEW REF. @. 0.00
    PRESS L/S BUTTON

    you must press the L/S button and you can start digging with **Dual Slope**.

11. iCON excavate iCP31 remembers the X direction, so you do not have to change the setting for X direction until you have a task for which the direction of X differs from the present setting.

User Menu tree

- **SETUP SYSTEM**
  - UNITS LENGTH
  - UNITS ANGLE
  - BEEP VOLUME
  - LIGHT INTENSITY
  - ALARM HEIGHT
  - REVERSED VIEW
- **SETUP HEIGHT**
  - GREENBAND MODE
  - GREENBAND
  - YELLOWBAND
  - YELLOW BEEP
  - REFERENCE OFFSET
  - HEIGHT DIRECTION
  - LASER MODE
- **SETUP BUCKET**
  - CALIBRATE BUCKET
    - ^v SELECT BUCKET
    - TOOL TYPE
    - BUCKET LEFT/RIGHT
    - TILT
    - BUCKET LEN
    - BUCKET ANGLE
    - BUCKET FLAT ANGLE
    - BUCKET WIDTH
    - TILT ZERO
    - AUGER LENGTH
    - DOG BONE L4
    - BUCKET NAME



* Password protected menu for support personnel only.

7 User Menu

Enter the User Menu

To enter the User Menu, press the Enter button ↵.
Select a menu option by pressing the left/right arrows ◆▶.
Press the Enter button ↵ to enter the sub-menus.
Change a value by pressing the up/down arrows ▲▼.

7.1 SETUP SYSTEM

UNITS LENGTH

This menu option is used to set in which unit the length is measured.
You can choose between meters, inches or feet.

UNITS ANGLE

This menu option is used to set in which unit the angle is measured.
You can choose between per cent, per thousand, gon, degrees or relative.

BEEP VOLUME

This menu option is used to set how loud the iCON excavate iCP31 Control Box is to beep.
You can choose between off, low, normal and loud.

LIGHT INTENSITY

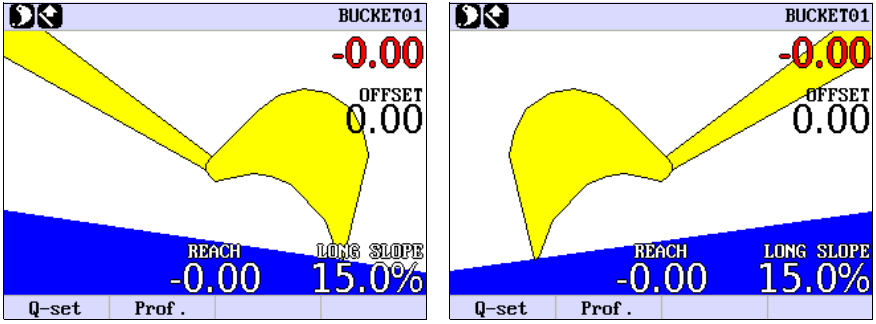
This menu option is used to set the light intensity in the display.
You can choose between the values from 0 to 15.

ALARM HEIGHT

This menu option is used to set how high up the pivot points are allowed to get. The value is the distance from the lowest pivot point.
You can save the value by moving the bucket to a desired alarm height and pressing the 0.00 button.

REVERSED VIEW

This menu option is used to reverse the view.
You can choose between **OFF** or **ON**.



7.2 SETUP HEIGHT

GREENBAND MODE

This menu option is used to set the position of the greenband **centred**, **above** or **below**, the **defined on grade level**.
Greenband is the interval in which the green light flashes.

GREENBAND

This menu option is used to set when the green diode/diodes in the middle of the remote display and on the Control Box respectively start to light.
The value is the distance from when the green diodes start to light until when the red arrow and diode start to light.

YELLOWBAND

This menu option is used to set when the yellow diodes on the remote display and on the Control Box respectively start to light.
The value is the distance from when the yellow diodes start to light until when the green diodes start to light.

YELLOW BEEP

This menu option is used to enable or disable the audible indication of being in the yellow band.

REFERENCE OFFSET

This menu option is used to set the reference height when the 0.00 button is pressed.

HEIGHT DIRECTION

The iCON excavate iCP31 is capable of measuring the height of the bucket point over the defined on grade plane either strictly vertical or normal to the defined on grade plane. Use this option to set the desired height direction.
You can choose between **NORMAL** and **VERTICAL**.

LASER MODE

This menu option is used to choose the nulling method.
You can choose between **OFF** and **INTEGRATED**.

- For **OFF**, the method is as described in section **"3 Single Slope Mode without Laser"**.
- For **INTEGRATED**, the method is as described in section **"4 Single Slope Mode with Laser"**.

7.3 SETUP BUCKET

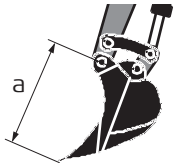
CALIBRATE BUCKET

In order to calibrate the bucket sensor, you must input some information about the length and angles of the bucket to the iCON excavate iCP31 System.

Follow the instructions below to do so:

1. Press the Enter button ↵. You will now enter the User Menu.
2. Select the menu option **SETUP BUCKET**. You select a menu option by pressing the left/right arrows ◀▶.
3. Press the Enter button ↵ to enter the menu option **CALIBRATE BUCKET**.
4. Press the Enter button ↵ to enter the menu option **^v SELECT BUCKET**.
5. Select the bucket you want to calibrate ▲▼. It is possible to select between 30 buckets.

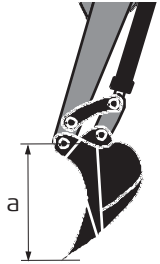
6. Press the right arrow ▶ to enter the menu option **TOOL TYPE**.
   Select which tool type you want to calibrate, Bucket or Auger.
7. Press the right arrow ▶ to enter the menu option **BUCKET LEFT/RIGHT**.
8. Select whether the bucket sensor is placed left or right. ▲▼.
   When making your choice, you must look on the lid of the sensor. If the lid is turned against the left side, then you must choose LEFT and vice versa.
   Note: if you choose the wrong side, the bucket and the graphics will work upside down.
9. Press the right arrow ▶ until the display shows **TILT**.
10. Select "NO" if the bucket is not a tilt bucket. Otherwise, select which tilt unit to use with the bucket. The system allows you to associate any one out of 5 tilt units to each bucket. Tilt units can be used with several buckets which is relevant when using a tilt coupling.
11. Press the right arrow ▶ until the display shows option **BUCKET LEN**.
12. Measure the distance between the pivot point of the bucket and the edge of the bucket.



a) BUCKET LEN

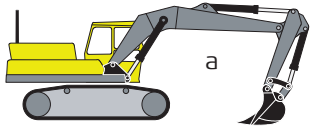
13. Press the up/down arrows ▲▼ until the display shows the distance between the pivot point and the edge of the bucket (BUCKET LEN) that you have measured in step 12.
14. Press the right arrow ▶ until the display shows **BUCKET ANGLE**.

15. Move the bucket of the excavator to a position where the line between the pivot point of the bucket and the edge of the bucket is in a straight vertical plane. To make sure that the line is in a straight vertical plane, we recommend that you use a spirit level. In calm weather, it is also possible to hold a plumb line to the pivot point and let it hang straight down. Then move the bucket until the leading edge touches the string.



a) BUCKET ANGLE

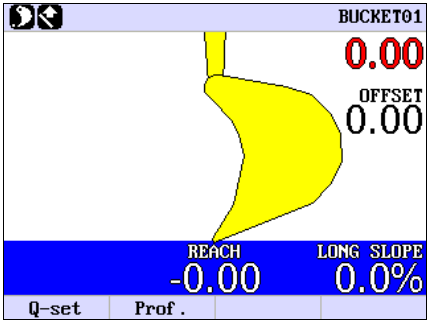
16. Press the [0.00] button when the bucket is in the position described before in step 15.
17. Press the right arrow ▶ until the display shows **BUCKET FLAT ANGLE**.
18. Move the bucket of the excavator to a position where the bucket can be used to level the surface evenly. (This part of the calibration is used to set how the movements of the bucket are shown on the Control Box. The position you put the bucket into will correspond to the middle diode of the Bucket Angle Indicator on the Control Box. See section LED Display in the Chapter System Overview.)



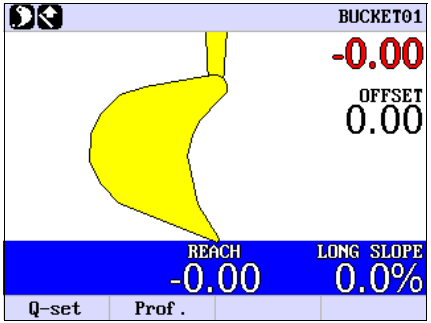
a) BUCKET FLAT ANGLE

19. Press the [0.00] button when the bucket is in the position described before in step 18.

You can mount a reversed Bucket.
Calibrate the reversed Bucket as normal and the graphic will reverse the Bucket on the screen.

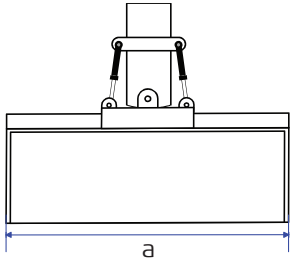


"Standard" bucket view



"Reversed" bucket view

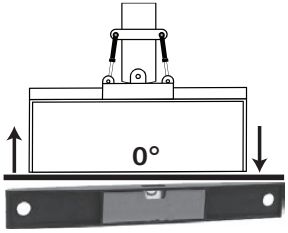
20. Press the right arrow ▶ until the display shows **BUCKET WIDTH**.
21. **BUCKET WIDTH**
    Measure the bucket width and press the up/down arrows ▲▼ until the display reads the width.
    The bucket sensor has now been calibrated.



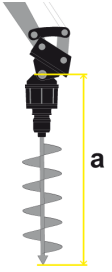
a) BUCKET WIDTH

22. Press the right arrow ▶ until the display shows **TILT ZERO**.

23. **TILT ZERO**
    This sub-menu is used to calibrate the tilt bucket this way:
    Move the bucket to a position where the bucket is level 0°.
    Use a spirit level to check that the bucket is level and press the 0.00 button.



24. Press the right arrow ▶ until the display shows **AUGER LENGTH**.
    This menu option is only used when an Auger is attached to the machine.
    If an Auger is not attached, then Auger Length should be set to 0.000
25. Measure the length of the auger from the swivel joint to the tip of the drill bit and press the up/down arrows ▲▼ until the display reads the length.
    The Auger has now been calibrated.



a) AUGER LENGTH

26. Press the right arrow ▶ until the display shows **DOG BONE L*4***.

27. **DOG BONE L*4***
    This sub-menu is only used when bucket sensor is mounted on the dog bone.

28. Press the right arrow ▶ until the display shows **BUCKET NAME.**
29. **BUCKET NAME**
    This sub-menu is used to give the various buckets a name after they have been calibrated. If you state @ as the first letter in the name, the iCON excavate iCP31 will generate the names BUCKET 1, BUCKET 2 etc. according to the number of buckets you have calibrated to the system.
    By pressing the left/right arrows ◀▶, you can move the position of the cursor.
    By pressing the up/down arrows ▲▼, you can change the letter.
30. Press the F4 button three times to leave the User Menu.

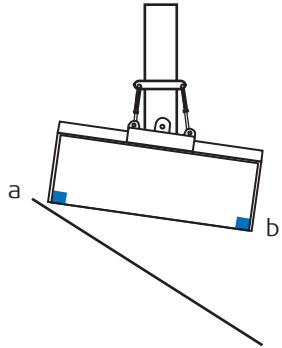
BUCKET POINT

At this option you choose which bucket point is used for height measurements.
You can choose between 5 settings:

- **MIDDLE**, **LEFT** or **RIGHT** side of the bucket as reference point.
  The chosen bucket point is shown with a green indication.

There are 2 other possibilities where the bucket point automatically changes between:

- **Closest**: the bucket point that is closest to the surface, or
- **Lowest**: the bucket point that is lowest without regard to the surface.
  The chosen bucket point is shown with a blue indication.



a) Closest b) Lowest

BUCKET INDICATOR

Enables or disables the bucket and tilt angle indicators.

BUCKET GREENBAND

Sets the sensitivity of the bucket angle indicator.

TILT GREENBAND

Sets the sensitivity of the tilt angle indicator. This means how fast you want the lamps in the Tilt Slope display to react. 0.5% corresponds to an accuracy of about ± 2 cm working with a bucket of 1 m.

7.4 DUAL SLOPE

Description

Turns the dual slope mode of the iCON excavate iCP31 on or off. Dual slope operation is described in section "5 Dual Slope Mode".

7.5 MEASURE

Description

With this menu option you can let the iCON excavate iCP31 calculate slope, height, and length in relation to 2 reference points.
You can choose which of the values is to be shown in the upper display.
Press the up/down arrows ▲▼ to select the value.
To let the iCON excavate iCP31 calculate slope, height and length, follow this procedure:

1. Place the tip of the bucket on the first reference point.
2. Press the 0.00 button to save the first reference point.
3. Place the tip of the bucket on the second reference point.

The upper blue box shows the slope, height or length according to which value you have selected.

If you want to work with the calculated slope, height and length, press the L/S button to save the second reference point.
After saving the second reference point, iCON excavate iCP31 automatically leaves the User Menu and returns to working mode.
There is no timeout at this menu option.

7.6 PROFILE

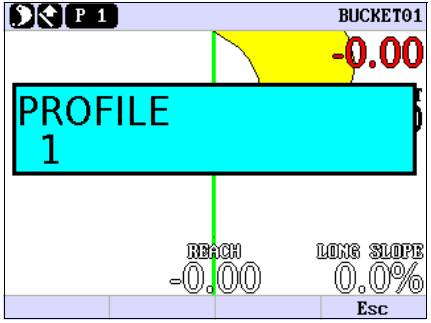
General information

The basic idea of making profiles is either to **copy/save** a job that is already carried out or to pre-define various distances with a slope to match.
After defining the distances or copying a job you can then dig the job at a stretch.

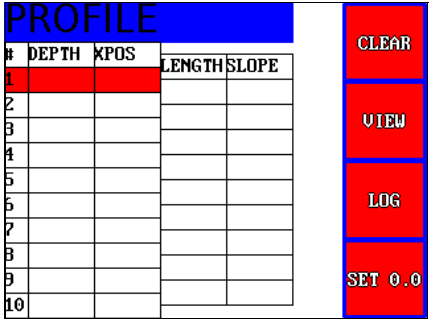
When you work in profile mode, you will only be able to work with slope in one direction and a laser as reference line cannot be used. So before you start, make sure that Dual Slope mode is disabled.

How to copy/save a job that already exists

1. Turn on the iCON excavate iCP31 Control Box.
2. Enter the User Menu by pressing the Enter button ↵.
3. Select the menu option **PROFILES** by pressing the left/right arrows ◆▶.
4. At the menu option **PROFILES** you can select a profile number by pressing the up/down arrows ▲▼.
   A small icon will indicate which profile is activated, for example P 1.
   Profile number 0 indicates that iCON excavate iCP31 is not running in profile mode.
   Profile number 11 is a Demo profile that cannot be changed.

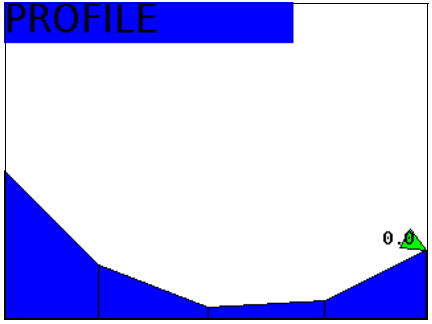


5. When you have selected a profile from 1 – 10, press the Enter button ↵ to activate the selected profile.

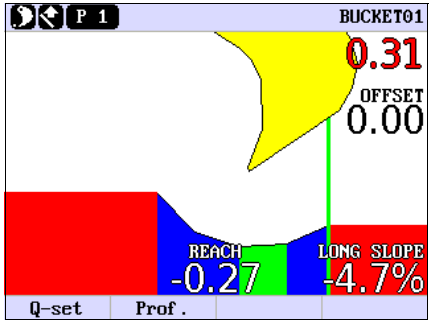


6. Place the bucket at the farthest point of the profile you want to copy/save.
7. Press the + button to LOG/Save this point as the first point of the profile.
8. Place the bucket at the second farthest point of the profile.
9. Press the + button to save this point as the second point. The slope and distance between the points is shown in the display.
10. Place the bucket at the third farthest point of the profile.
11. Press the + button to save this point as the third point. The slope and distance between the points is shown in the display.
12. Place the bucket at the fourth farthest point of the profile.
13. Press the + button to save this point as the fourth point. The slope and distance between the points is shown in the display. Continue this operation until you have saved all points in your profile. You can save up to 10 points in a profile.

You can get a graphic view of your profile by pressing the [X-] button.

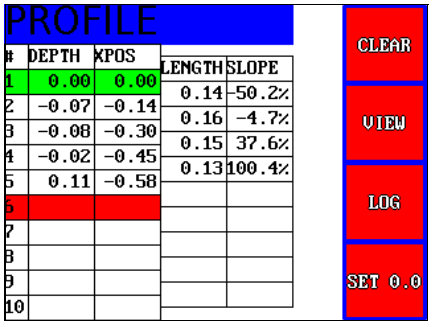


14. Press the Enter button ↵ two times to save and leave the profile.

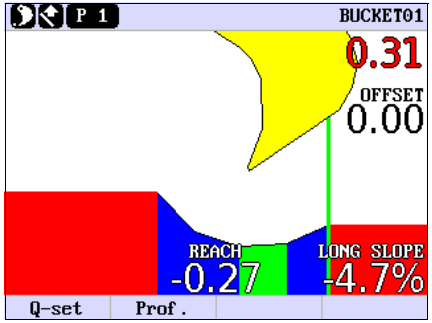


The green vertical line indicates your 0-point, the farthest point of the profile.

The 0-point can be moved the following way:
Enter the profile. Use the up/down arrows ⬍ to move the red bar to the point that you want to be your new 0-point. Press the [-] button (SET 0.0).



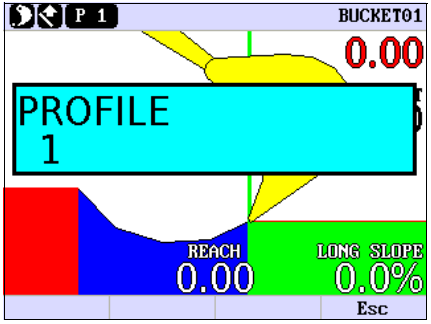
- The **green area** indicates that this area is included in the profile, and your bucket is working in this area right now.
- The **blue area** indicates that this area is included in the profile, but your bucket is not working in this area right now.
- The **red area** indicates that this area is NOT included in the profile.



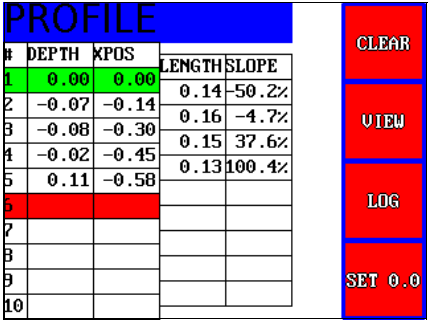
When you are at the Main Screen, you can press the [F2] button to enter the settings of the selected profile.

How to set up/change a profile by stating the length and slope

1. Turn on the iCON excavate iCP31 Control Box.
2. Enter the User Menu by pressing the Enter button ↵.
3. Select the menu option **PROFILES** by pressing the left/right arrows ◀▶.
4. At the menu option **PROFILES** you can select a profile number by pressing the up/down arrows ▲▼.
   A small icon will indicate which profile is activated, for example **P 1**.
   Profile number 0 indicates that iCON excavate iCP31 is not running in profile mode.
   Profile number 11 is a Demo profile that cannot be changed.



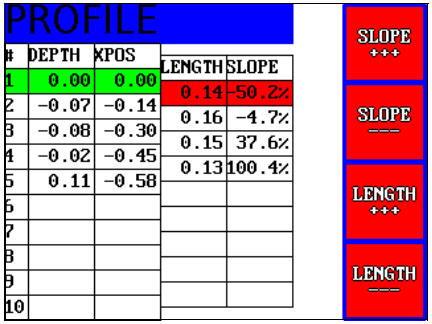
5. When you have selected a profile from 1 – 10, press the Enter button ↵ to activate the selected profile.



6. Press the right arrow ▶ to set up/change the selected profile.

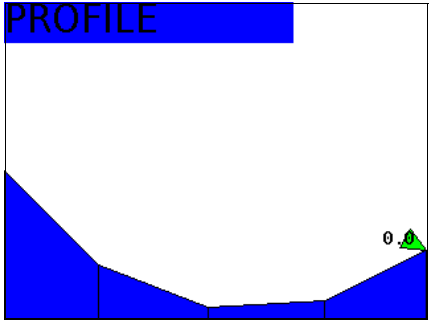
7. Press the [+] or [-] button to state the length of the first stretch of the profile.

8. Press the [X+] or [X-] button to state the slope of the first stretch of the profile.



9. Press the down arrow ▼ to get to the next stretch of the profile.
10. Press the [+] or [-] button to state the length of the next stretch of the profile.
11. Press the [X+] or [X-] button to state the slope of the next stretch of the profile.
    The length and slope between the points are shown in the display.
    Repeat the procedures 10. and 11. until you have stated all the stretches you want to include in the profile.
    You can state up to 10 stretches in the profile.

You can get a graphic view of your profile by pressing the left arrow ◀ and subsequently the X- button.



12. Press the Enter button ↵ two times to save and leave the profile.

7.7 CABLE DETECTION

Description

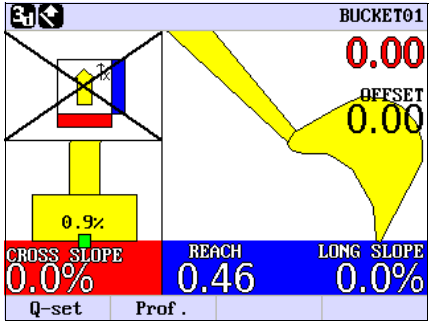
Please refer to the Cable Detection EZiDIG User Manual regarding the settings for CABLE DETECTION.

7.8 3D/GPS MODE

Description

This menu option enables or disables 3D mode.
In 3D mode, the iCON excavate iCP31 communicates with an external 3D machine control system to provide control of the excavator in three dimensions.

When 3D MODE has been selected, the 3d icon will be shown in the display.



7.9 SERVICE MENU

Description

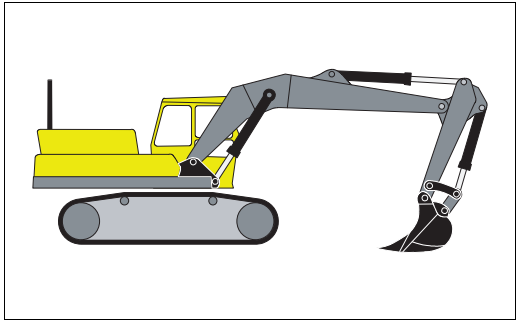
Password protected menu for support personnel only.

8 Reversed Bucket

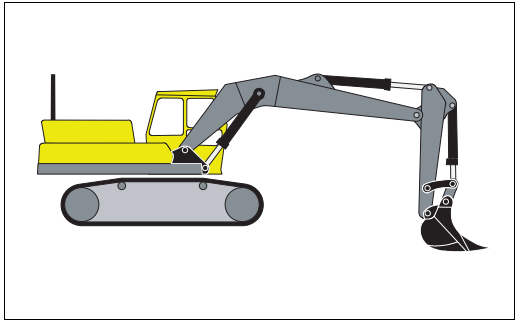
Description

You can mount a reversed bucket.

Calibrate the reversed Bucket as standard bucket and the graphic will reverse the bucket on the screen.



"Standard" bucket view



"Reversed" bucket view

9 Quick Settings

General

The basic idea of Quick Settings is to make it possible for the user to change between 10 different settings.
Each setting includes values for: Offset, Slope in X-direction, Tilt Slope, Datum Height, Direction of X and the bucket selected.

How to make a Quick Setting

1. Turn on the iCON excavate iCP31 Control Box.
2. Enter Quick Setting by pressing the F1 button.
3. Select the Quick Setting number you want to make by pressing the up/down arrows ▲▼.

The green bar indicates which Quick Setting will be active when you return to working mode.

QUICK SETTING

#	DEPTH	XSLOPE	CROSS	DATUMH	DIR	BUCKET
1	0.00	17.4%	0.0%	0.00	@	BUCKET01
2	0.00	-23.7%	0.0%	0.00	@	BUCKET01
3	0.00	0.0%	0.0%	0.00	@	BUCKET01
4	0.00	0.0%	0.0%	0.00	@	BUCKET01
5	0.00	0.0%	0.0%	0.00	@	BUCKET01
6	0.00	0.0%	0.0%	0.00	@	BUCKET01
7	0.00	0.0%	0.0%	0.00	@	BUCKET01
8	0.00	0.0%	0.0%	0.00	@	BUCKET01
9	0.00	0.0%	0.0%	0.00	@	BUCKET01
10	0.00	0.0%	0.0%	0.00	@	BUCKET01

4. Press the Enter button ↵ to enter the values for the selected Quick Setting. You will return to working mode.
5. Enter the values by using the normal buttons for Offset, Slope, Bucket etc. The values will be stored as a Quick Setting and you can start to dig.

How to change between Quick Settings

1. Enter Quick Setting by pressing the F1 button. You will see a green and a red bar.
2. The red bar indicates the settings you had before entering Quick Setting.
3. The green bar indicates the settings that you will have when leaving Quick Setting and return to working mode by pressing the F1 button.
4. To select a Quick Setting move the green bar up or down by pressing the up/down arrows ▲▼.

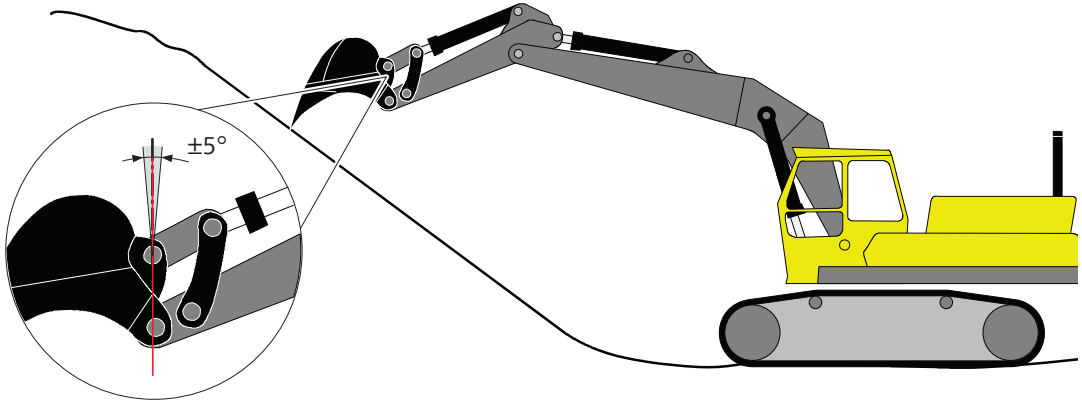
10 Special Working Situations

10.1 Tilt Sensor

Description

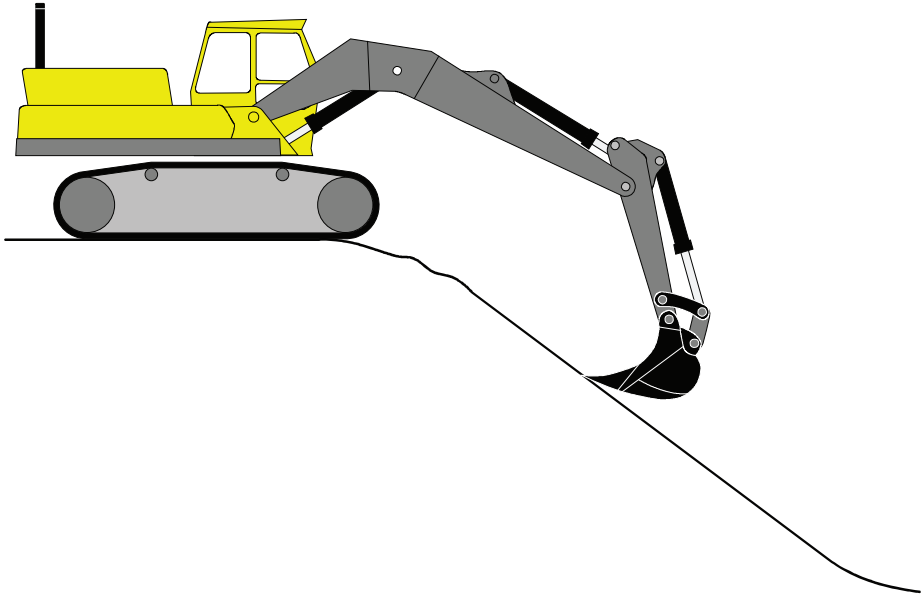
Under special circumstances, you may experience that the option **Tilt sensor** cannot follow the right measure/height. This will affect the height value that is shown in the upper red display. The value will "jump". This can happen during a pull – please just ignore it and continue, the system will then settle back and show the right height.

The above mentioned situation will appear when the Delta Angle is in vertical position ±5° like shown in the drawing below.



Solution

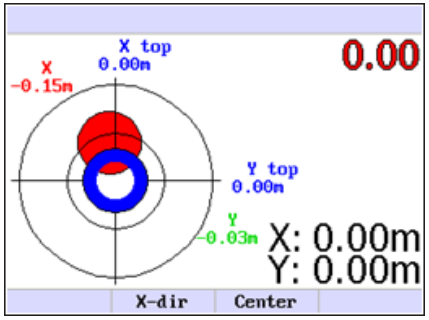
- Move the machine closer to the profile, so that you do not have to open the bucket fully, or
- Move the machine on top of the profile, and work from the bottom to the top.

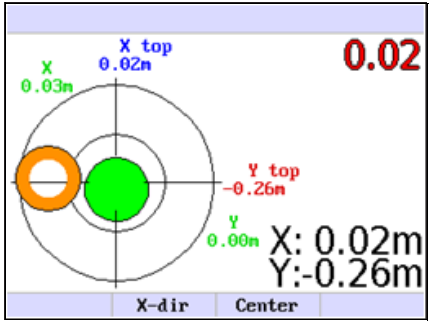


10.2 Using an Auger

Explanation of the work screen

- The drill bit tip will be shown as a circle and have the color Green (0-5 cm) or Red (+5 cm).
- The top point of the auger will be shown as a ring and have the color Blue (0-5 cm) or Orange (+5 cm).
- The inner part of the cross hairs will be highlighted when the drill bit and top of the drill is within the specified tolerance.
- The X and Y **top** tell you how far the top of the auger is from zero.
- The X and Y tell you how far the auger is from center.
- In the right top corner is the high shown relative to zero.
- In the lowest right corner you can see X and Y, this indicate how much you have moved the auger away from the first hole.
- If you move the auger 2 meters in the X direction and will drill a new hole the place the Auger 2-3 cm above the ground and press the F3 button. (center).
- The circle and the ring will now be on top of each other and you can start drill.

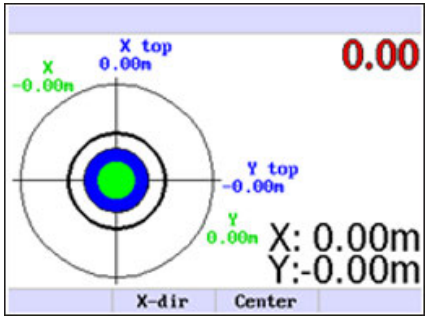




How to use the Auger

To use a Auger on your excavator, please follow the procedure below:

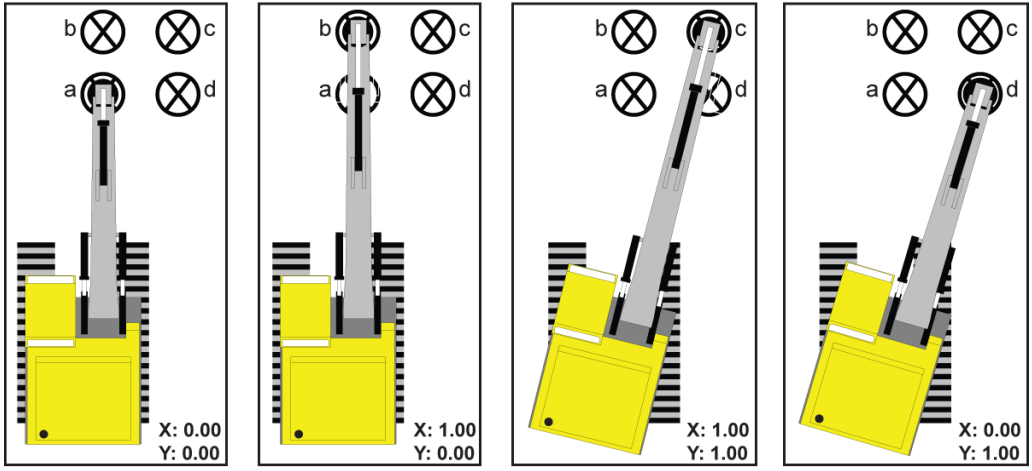
1. Place the auger over the first point you want to drill.
2. Press the X-dir button and set the direction. (Select 1 or 2 points option with the up or down arrows and press Enter).
3. Press the 0.00 button when the auger and direction are placed and set correct.
4. Start drilling.



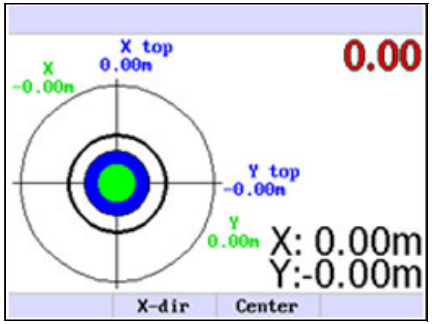
☞ When drilling the next hole, just move the upper part of the excavator (not the tracks) and use the X and Y for placing the next hole. Press Center (F3) when the auger is placed correct, and then start drilling.

☞ The X and Y direction can be affected by iron objects around the machine.

Example
You want to drill 4 holes; a, b, c and d.
Hole b is to be drilled 1 m in the X axis from hole a.
Hole c is to be drilled 1 m in the X axis and 1 m in the Y axis from hole a.
Hole d is to be drilled 1 m in the Y axis from hole a.



1. Place the auger over hole a.
2. Press the X-dir button and set the direction. (Select 1 or 2 points option with the up or down arrows and press Enter).
3. Press the 0.00 button when the auger and direction are placed and set correct.
4. Start drilling.
5. Move the auger without moving the tracks of the machine until the display reads X: 1.00m and Y: 0.00m.
6. Press Center (F3).
7. Start drilling.
8. Move the auger without moving the tracks of the machine until the display reads X: 1.00m Y: 1.00m.
9. Press Center (F3).
10. Start drilling.
11. Move the auger without moving the tracks of the machine until the display reads X: 0.00m Y: 1.00m.
12. Press Center (F3).
13. Start drilling.



11 Diagnose Screen

Description

This is a diagnose tool to view the status of sensors and error messages. If a cable breaks or a sensor is dead, it is easily possible to verify where the problem is.
To activate this screen, you must push the left/right arrows ◀▶ at the same time.

Example of a diagnose screen

SENSOR		VALUE	VERSION	ENAB	STAT
ROLL		-0.05	RS10A200	YES	ON
PITCH		2.20	RS10A200	YES	ON
BOOM1		45.91	XIS1 202	YES	ON
BOOM2		0.00		NO	OFF
STICK		2.77	XIS1L203	YES	ON
BUCKET	*	-131.48	IS3 3.01	YES	ON
TILT	!	-0.16	IS2 3.01	YES	ON
XIS1LASER		0x00			OFF
RS10 FLUX		210.78	RS10A200	YES	ON
EXTENSION		0.00		NO	OFF
CABLE DET.		0		NO	OFF
XC14 v2.4.0					

On the diagnosis screen you can see a detailed system status information.

The most important columns are the last two: ENAB and STAT.
They will show if there is a deviation.

- **ENAB** tells the setting for the sensor that has been made in the technical menu. When the sensor is activated, YES will be shown.
- **STAT** tells if the sensor is working.
  ON shows that the sensor is working, OFF shows a failure either in the sensor or in the cable connection from the previous sensor - this is meant from the cabin and out towards the bucket.
- ***** tells that the Bucket Sensor needs to be recalibrated. Please contact your local dealer.
- **!** tells that the Tilt Sensor is not working correctly. Please contact your local dealer.

12 Care and Transport

12.1 General Notices

General information	Servicing the system only requires a minimum of time. All electronic components are enclosed in robust housings to safeguard them against mechanical damage.
Periodic checks	If any iCON excavate iCP31 components are subjected to severe impact, be sure to check for proper operation prior to performing any work with the system.

12.2 Transport

Transport in the field	When transporting the equipment in the field, always make sure that you carry the product in its original transport container.
Transport in a road vehicle	Never carry the product loose in a road vehicle. It can be affected by shock and vibration. Always carry the product in its transport container and secure it.
Shipping	When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging transport container and cardboard box, or its equivalent, to protect against shock and vibration.
Field adjustment	After transport inspect the field adjustment parameters given in this user manual before using the product.

12.3 Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "14 Technical Data" for information about temperature limits.

Field adjustment

After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.

12.4 Cleaning and Drying

Product

- Blow off dust.
- Use a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol.
- Do not use other liquids; these may attack the polymer components.

Cables and Plugs

- Keep plugs clean and dry.
- Blow away any dirt lodged in the plugs of the connecting cables.

Damp products

- Dry the products at a temperature not greater than 40°C/108°F and clean them.
- Do not repack until everything is completely dry.

13 Safety Directions

13.1 General

Description

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

13.2 Intended Use

Permitted use

- Control of machine tool for generic working in height, slope, and if present, side shift, based on reference height, reference line, and machine geometry.
- Detection of machine geometry by machine-mounted slope and rotation sensors.
- Detection of a desired reference height and/or slope by laser or sonic sensors.
- Recording measurements.
- Computing by means of application software.
- Guidance of the operator.

Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the work site, for example working on roads.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.

⚠ Warning

Adverse use can lead to injury, malfunction and damage.
It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed how to work with it.

⚠ Warning

Unauthorised modification of machines by mounting the product may alter the function and safety of the machine.
Precautions:
Follow the instructions of the machine manufacturer. If no appropriate instruction is available, ask machine manufacturer for instructions before mounting the product.

13.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

⚠ Danger

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

13.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

Manufacturers of non-Leica Geosystems accessories

The manufacturers of non-Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.

Warning

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

Warning

This product may be installed on building machinery only by an appropriately trained and qualified specialist.

13.5 Hazards of Use

Warning

Only Leica Geosystems authorised service workshops are entitled to repair these products.

Caution

Installing near mechanically moving machine components may damage the product.
Precautions:
Deflect the mechanically moving machine components as far as possible and define a safe installation zone.

Warning

Beware of inadequate steering if machine is defective like after a crash or other damaging events or alterations to the machine.
Precautions:
Periodically perform control measurements and field adjustments on the machine as specified in the User Manual. While working, construction and grading should be checked by appropriate means, for example spirit level, tachymeter, before and after important measuring tasks.

Warning

While steering or navigating the machine accidents may occur due to a) the operator not paying attention to the surroundings (persons, ditches, traffic, etc.), or b) malfunctions (...of a system component, interference, etc).
Precautions:
The operator assures that the machine is operated, guided and monitored by a qualified user (e.g. driver). The user has to be able to take emergency measures, for example an emergency stop.

⚠ Warning

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.

Precautions:

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

⚠ Caution

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important operations.

⚠ Danger

Because of the risk of electrocution, it is very dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

⚠ Warning

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.

Precautions:

Do not use the product in a thunderstorm.

Warning

During dynamic applications, there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

Precautions:

The person responsible for the product must make all users fully aware of the existing dangers.

Warning

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

Precautions:

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.

Warning

If computers intended for use indoors are used in the field there is a danger of electric shock.

Precautions:

Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with Leica Geosystems products.

Caution

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.

Precautions:

When setting-up the product, make sure that the connecting cables, are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the product to mechanical stress.

⚠ Warning

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gas are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:

The product must not be disposed with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorised personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems dealer.

13.6 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatability is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic distur-bances to other equip-ment.

Warning

Electromagnetic radiation can cause disturbances in other equipment.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

Caution

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.
Precautions:
Use only the equipment and accessories recommended by Leica Geosystems.
When combined with the product, they meet the strict requirements stipulated by the guide-lines and standards. When using computers and two-way radios, pay attention to the infor-mation about electromagnetic compatibility provided by the manufacturer.

Caution

Disturbances caused by electromagnetic radiation can result in erroneous measurements.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.
Precautions:
Check the plausibility of results obtained under these conditions.

⚠ Warning

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.
Precautions:
While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

13.7 FCC Statement, Applicable in U.S.

Warning

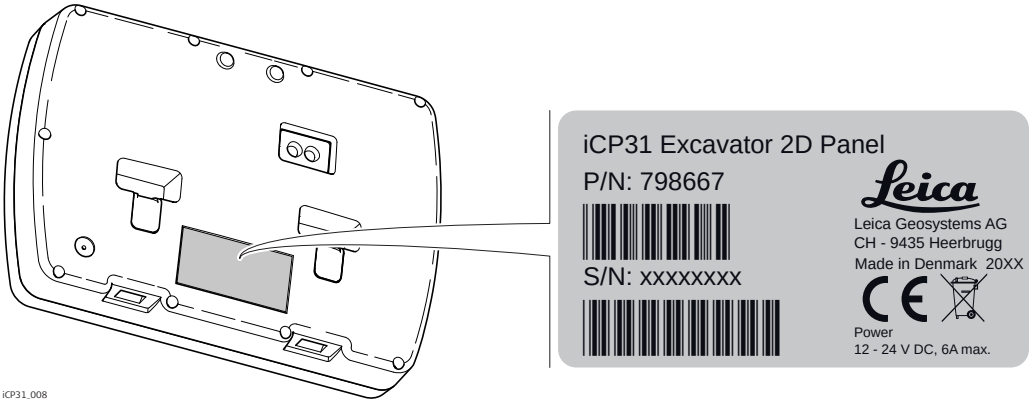
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication.
However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

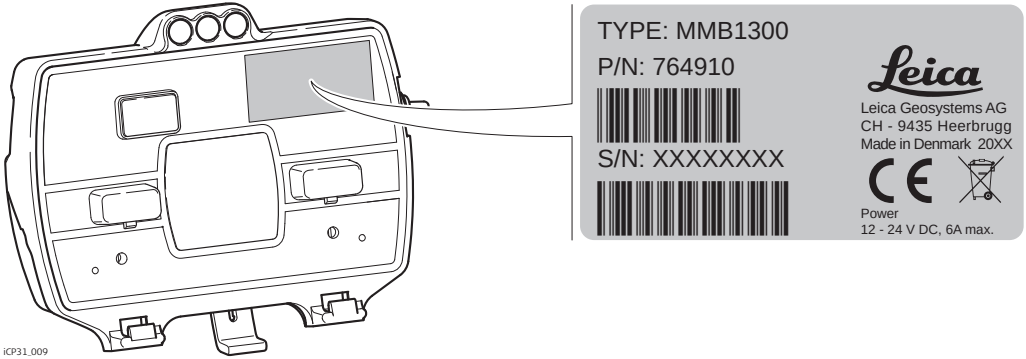
Warning

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

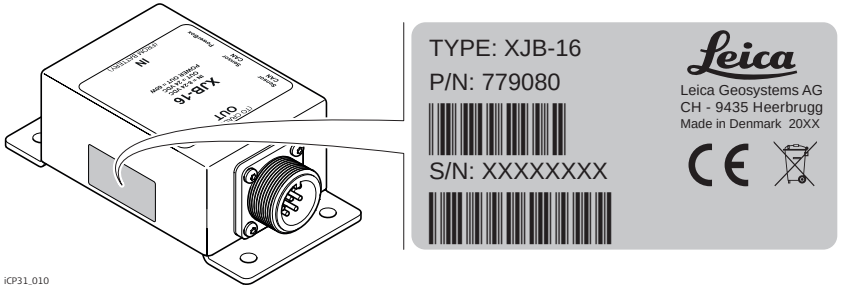
Labelling Control Box



Labelling Cradle

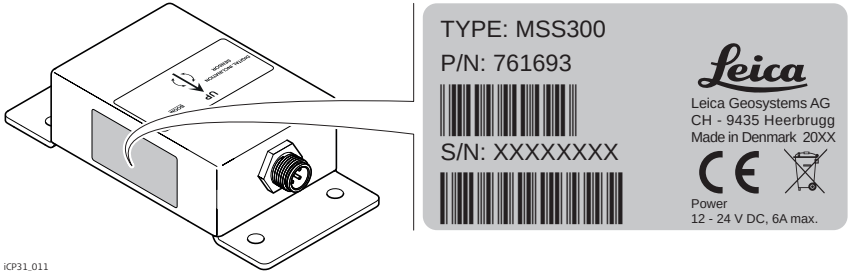


Labelling Junction Box



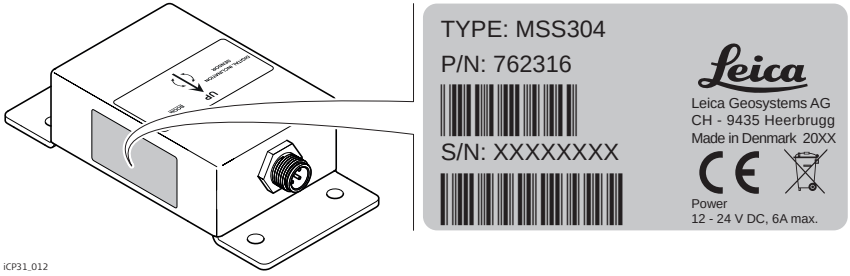
iCP31_010

Labelling Boom 1 Sensor



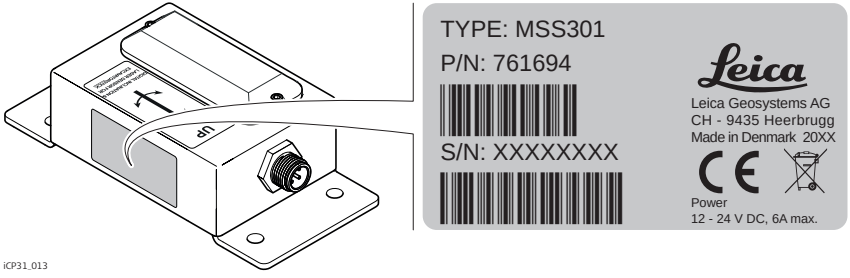
iCP31_011

Labelling Boom 2 Sensor



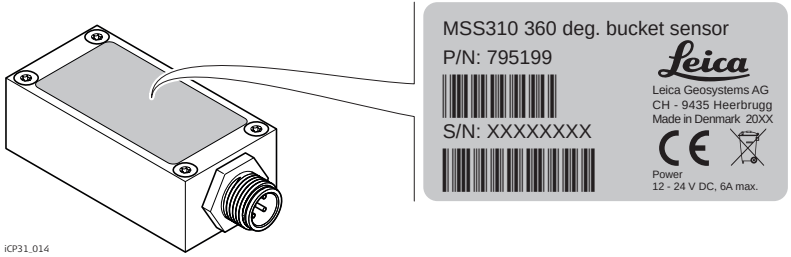
iCP31_012

Labelling Stick/Laser Sensor



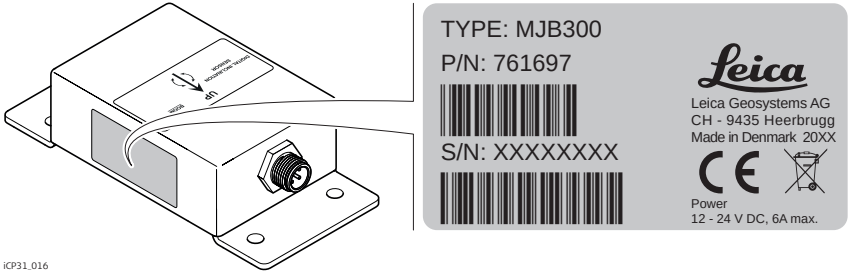
iCP31_013

Labelling Bucket Sensor

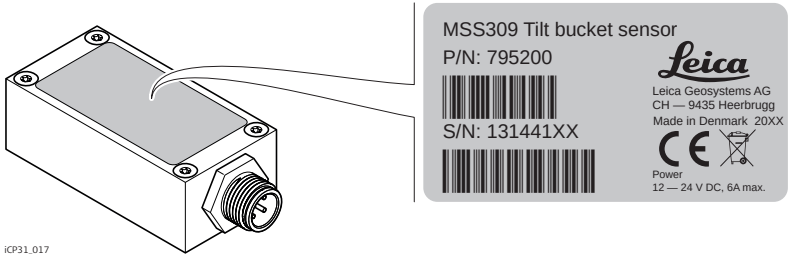


Labelling Compas and Pitch/Roll Sensor

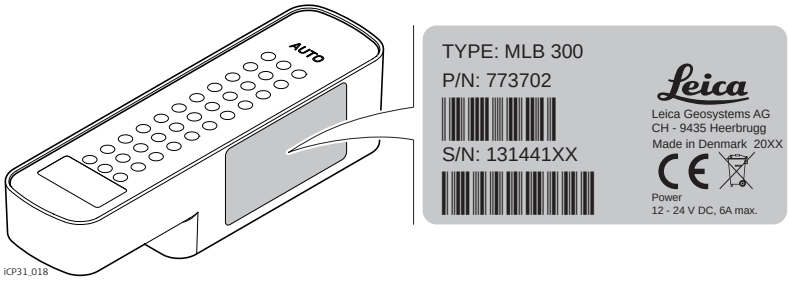
Labelling Can Junction Box



Labelling Tilt Bucket Sensor



Labelling Remote Display



14 Technical Data

14.1 Accuracy of the System

Digging system dual slope

Accuracy depends upon various factors including the calibration accuracy, the size of the machine, worn out joints, if the excavator is placed on stable ground.

The accuracy of the system is 0.2 % of the reach of the machine, measured at the bucket point when the machine is positioned on a level surface.

Accuracy of the rotation sensor
Accuracy of the rotation sensor is 2° or better.

14.2 General Technical Data

Protection class

Unit	Protection class
Control Box	IP67
All Sensors	IP68
Cradle	IP54
Junction Box	IP68
Can Junction Box	IP68

Temperature

Unit	Operating temperature [°C]	Storage temperature [°C]
All Units	-20 to +70	-40 to +80

Control Box

Parameter	Specification
Voltage range	24V DC Nominal Voltage Range 10V - 30V
Current consumption	‹200mA @ 24VDC
Graphic display	4" LCD colour screen
Keypad	18 keys, with backlight
Interfaces	Infrared
Dimensions	12.5 x 18 x 3.7 cm
Weight	0.5 kg

Cradle

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	< 2.5A with control box connected and no load at 12 V
Output	2 x RS232, RX, TX, 12V/2Amp, GND, 2 x MikroCAN and J1939
Communication (Infrared)	1 Mbit
Dimensions	12.4 x 15.2 x 4.4 cm
Weight	0.320 kg

Bucket Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	1 x CAN M12
Dimensions	2.5 x 2.5 x 5 cm
Weight	0.100 kg

Stick/Laser Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	2 x CAN M12
Range	19 cm to 150 m (depended on laser)

Parameter	Specification
Laser requirement	All Rotating Lasers (visible HeNe, invisible Infrared diodes Laser)
Operating range	55 mm
Dimensions	8 x 12 x 3 cm
Weight	0.750 kg

Tilt Bucket Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	1 x CAN M12
Dimensions	2.5 x 2.5 x 5 cm
Weight	0.100 kg

Rotation Sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	2 x CAN M12
Dimensions	ø 7 cm, height incl. Mast: 80 cm
Weight	0.500 kg

Can Junction Box

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	2 x CAN M12
Dimensions	8 x 12 x 3 cm
Weight	0.750 kg

Angle sensor

Parameter	Specification
Voltage range	12/24 Volts dc (nom)
Current consumption	0,2A @ 24VDC
Interfaces	2 x CAN M12
Dimensions	8 x 12 x 3 cm
Weight	0.750 kg

14.3 Conformity to National Regulations

Conformity to national regulations

CE Hereby, Leica Geosystems AG, declares that the iCON excavate iCP31 Control Box is in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

15 International Limited Warranty, Software Licence Agreement

International Limited Warranty

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the Leica Geosystems home page at http://www.leica-geosystems.com/internationalwarranty or collect from your Leica Geosystems distributor.

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Total Quality Management: Our commitment to total customer satisfaction.

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica Geosystems dealer for more information about our TQM program.

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- when it has to be **right**

Leica Geosystems